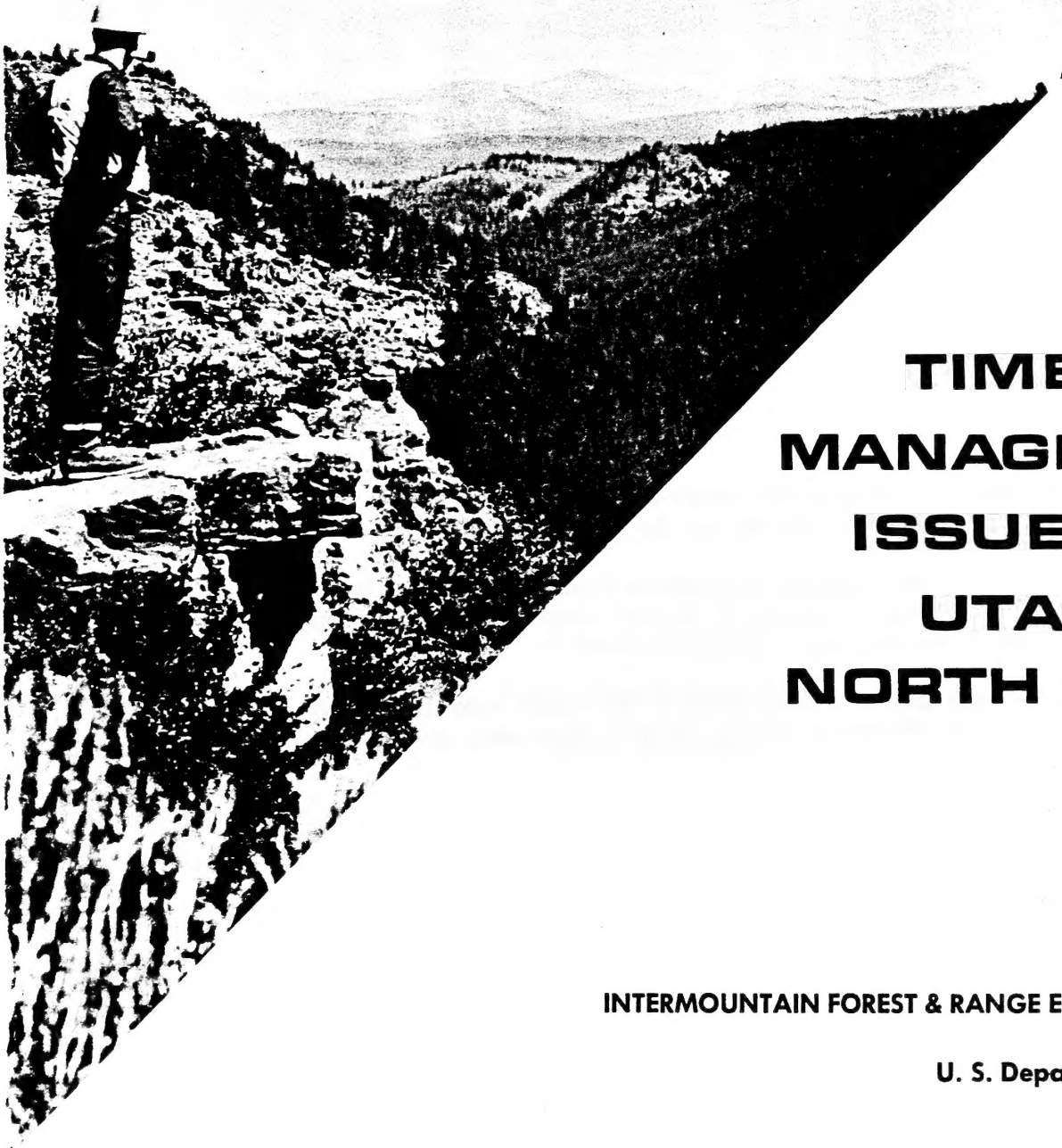


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TIMBER MANAGEMENT ISSUES ON UTAH'S NORTH SLOPE

INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
Forest Service
U. S. Department of Agriculture
Ogden, Utah

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The utility and value of any National Forest resource must be examined within the context of the multiple use principle. The timber resource pictured here on the shores of Dollar Lake in the Uinta Wilderness is an example. Although this lake is about 10 miles from the nearest road, hundreds of persons travel by foot or on horseback to it each summer. To exclude this lake from analysis of the timber resource would be as unrealistic as to exclude the timber from consideration of the recreation resource. More than 2,000 lakes and ponds are scattered through the North Slope area; nearly 400 of them are larger than 1 acre.

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INTRODUCTION

The forests of the Mountain States show a wide range of productivity. Almost 10 million acres have the capacity, if managed well, to grow more than 400 board feet per acre annually, thus ranking among the more productive timberlands in the Nation. Everything else being equal, these areas offer the best opportunity for profitable investment in timber growing.

At the other end of the scale, several millions of acres show much lower productivity. No prudent individual would be interested in such forests solely as timber investments. However, that point is academic because most of those lands are publicly owned. As the residual legatee of the land management responsibility, the public lacks any significant opportunity to divest itself of such lands. The issue instead is how to manage them.

Stumpage revenue is not the sole consideration or even the overriding one on public timberlands. Public interest involves an array of considerations, some of which are readily described and evaluated, some of which are not. The decision of how much to invest and where to invest in timber management is not therefore a simple matter of rates of return on the investment but is a complex matter involving many aspects of public welfare. Some of the issues involved are "sticky" indeed. Some aspects of future value cannot now be estimated with confidence. The relation of timber management to other land uses is broadly understood but the specifics have yet to be worked out. Yet, public land managing agencies—in this case the United States Forest Service—must arrange the various considerations on some logical basis if they are to make completely rational decisions as to what should be done and why.

The purpose of this publication is to describe the timber resource problem and the broad issues of management on the North Slope, which is a representative "low site" area in the Mountain States.

THE FOREST OF THE NORTH SLOPE

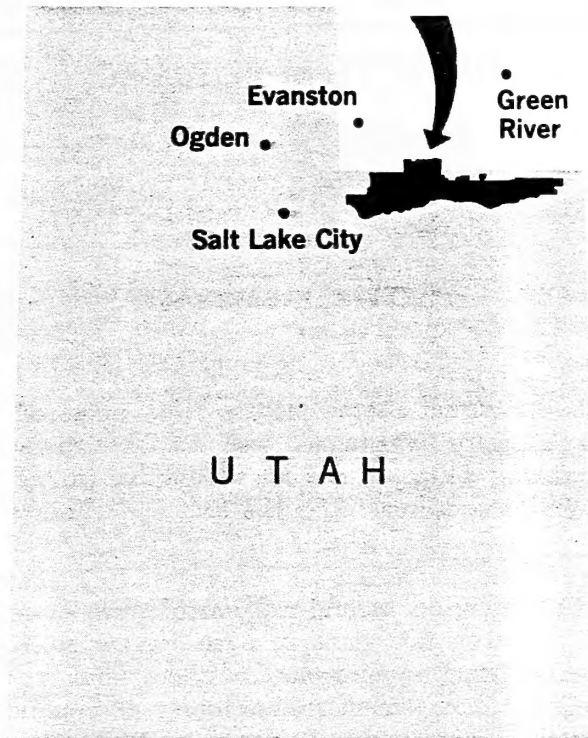


Figure 1

The North Slope is a strip of land 75 miles long by 20 miles wide. Most of its 677,000 acres are in National Forest ownership and lie within the Ashley and Wasatch National Forests. The area is divided into three Ranger Districts: the Manila District on the eastern end is in Ashley National Forest; the Mountain View and Evanston Districts are in Wasatch National Forest.

Although the first impression one gets of the North Slope is of an endless expanse of trees, nearly one-fourth is meadows, rockslides, and other nonforest land. Seventeen percent of the land area is classified as noncommercial; that is, it is either reserved in the High Uinta Primitive Area or is nonproductive forest, or both.

Sixty percent of the North Slope, or 404,000 acres, is classified as "commercial"; that is, it is suitable and available for timber production.¹

Most of the commercial forest land area (70 percent) is lodgepole pine type. The remainder are spruce, ponderosa pine, aspen, and Douglas-fir types. During the construction of the Union Pacific Railroad, hundreds of thousands of railroad ties were logged on the North Slope but timber harvest since that time has declined. The drain on the forest has been minor in relation to the timber available, and as a result the area is relatively un-

¹Land classed as commercial forest must be producing or capable of producing crops of industrial wood and not withdrawn from timber use. However, about 25,000 acres of land meeting this requirement is considered nonloggable, either because logging might damage watersheds, or because steep slopes or rock outcrops make logging impractical.

developed. It is a major watershed in Utah, an important big game area, and has considerable recreation potential. There are about 400 lakes and 600 miles of streams on the North Slope.

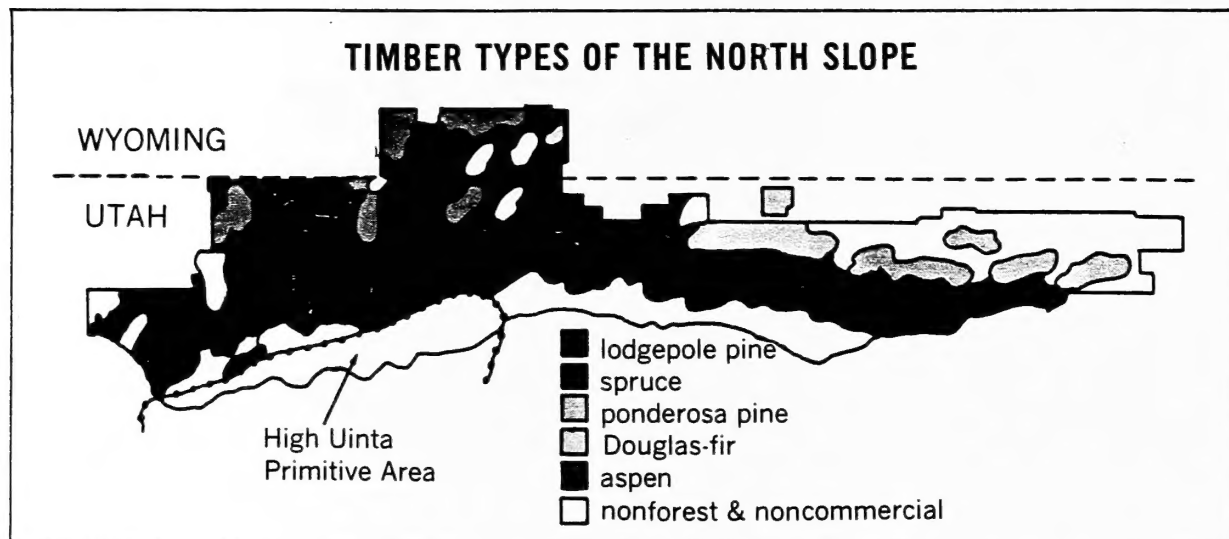


Figure 2

Table 1. — AREA BY LAND CLASS

Land class	Acres	Percent
Unreserved land		
Commercial forest		
Loggable	378,699	55.9
Nonloggable	¹ 25,000	3.7
	403,699	59.6
Noncommercial forest	54,349	8.0
Nonforest	158,775	23.5
Reserved land		
Primitive area	¹ 60,000	8.9
Total	676,823	100.0

¹Estimated

Table 2. — AREA BY OWNERSHIP CLASS

Ownership class	Acres	Percent
National Forest	618,015	91.3
State	21,130	3.1
Private	37,678	5.6
Total	676,823	100.0

Table 3. — AREA OF COMMERCIAL FOREST LAND
BY FOREST TYPES

Forest type	Acres	Percent
Lodgepole pine	283,296	70
Spruce (Engelmann)	52,623	13
Ponderosa pine	23,705	6
Aspen-cottonwood	20,899	5
Douglas-fir	18,660	5
Subalpine fir	4,516	1
Total	403,699	100

THE NORTH SLOPE FOREST RANKS LOW IN PRODUCTIVITY AND POSES DIFFICULT MANAGEMENT PROBLEMS

Except for some steep, rough areas along the Green River Canyon and just under the Uinta Peaks, most of the commercial forest land on the North Slope is nearly level or gently rolling.

However, the North Slope has more than its share of less productive land. More than three-fourths of the commercial forest is classified as "low site" or "very low site" land, on which tree growth is very slow (table 4). For example, lodgepole pine growing on low site land averages only about 11 inches in diameter and 55 feet in height even when trees develop free of such disturbances as fire, insects, and disease, and are not overcrowded. Figures 3 and 4 show typical low site areas.

These site estimates may be unduly minimizing, at least in the lodgepole pine type where overstocking tends to shorten height growth. No allowance was made for this factor in classifying the site of North Slope lands.

Table 4. -- AREA OF COMMERCIAL FOREST LAND
BY SITE CLASS

Site class ¹	Acres	Percent
Good	261	(2)
Medium	75,329	19
Low	225,133	56
Very low	82,640	20
Unclassified aspen	20,336	5
Total	403,699	100

¹ Forest Survey site class standards were used in conifer types. Most of the aspen growing on the North Slope is so poor that it cannot be considered for commercial purposes; so no site classification was attempted.

²Less than 0.5 percent.



Figure 3. — Seventy-seven thousand acres of lodgepole pine forest are on shallow soils of limited productivity. The trees on this ridge average only 5 inches in diameter and 26 feet in height, although they are 80 years old.

There is, of course, some more productive land on the North Slope. Nineteen percent is classified as medium site. Medium site lodgepole pine land such as is shown in figure 5 can produce about 19 thousand board feet per acre of sawtimber in a rotation period.

Figure 4. — The ponderosa pine forest in the Manila District includes a few small patches of excellent trees. However, this is more than offset by many acres of scrubby timber such as this. The growth rate is slow and the stand reestablishment rate is even slower on these rocky areas.



Figure 5. — The best timber-growing opportunity on the North Slope lies in the 75,000 acres of medium site land such as is pictured here.



If the North Slope were to be brought under management as a sustained yield unit, the task would be difficult because the age distribution is unbalanced and is dominated by overmature stands. More than half of the coniferous forest bears stands that are mature or overmature. Much of this timber is more than 200 years old, and a few stands are 3 or 4 centuries old. Annual losses are consequently high.

The situation is likewise unsatisfactory at the other end of the age scale, for there are very few young stands. Stands less than 60 years old occupy only 23,000 acres, and there is a very small area of timber less than 20 years old.

The bulk of the younger timber is from 60 to 100 years old. Most of these stands were established following fire cutting and subsequent fires before 1900 (table 5).

As in every other locality where there is much lodgepole pine, overstocking has created a principal management problem. This is not readily evident in present classifications, which indicate that only 13 percent is overstocked by basal area standards (table 6). However, a much greater area apparently was overstocked earlier in the life of present stands. This is shown by diameters of trees in relation to their age. For example, about 146,000 acres of lodgepole pine poletimber that are classed as medium or well stocked (by all sizes of trees) are actually only poorly stocked with larger or pole-size trees. Yet these stands are old enough to have a good stocking of poles.

Table 5. — AREA OF CONIFER FOREST BY AGE CLASS

Age class (years)	Acres
0 - 19	3,233
20 - 59	19,807
60 - 99	97,301
100 - 139	50,628
140 +	211,831
Total	382,800

Table 6. — AREA OF COMMERCIAL FOREST BY STOCKING CLASS

Stocking class	Acres	Percent
Overstocked	52,121	13
Well stocked	140,478	35
Medium stocked	184,574	45
Poorly stocked	24,074	6
Nonstocked	2,452	1
Total	403,699	100

The effect of overstocking in the past is also indicated by an estimate that almost one-fourth of the mature lodgepole pine stands are of less than sawtimber size. Some of these are on very poor sites, which accounts for the very small size of the trees but in many other cases the situation is simply the result of overcrowding. Often a natural but tardy



Figure 6. — This overstocked 80-year-old stand exemplifies the crowding problem at its worst. There are 10,000 stems per acre averaging about 2 inches in diameter. This site could grow trees 9 inches in diameter in 80 years if stocking were controlled.

thinning has removed evidence of past overcrowding; however, the size-age relationship of the remaining stems clearly reveals that this was the problem.

The most severe instances of overcrowding are in 4,119 acres of stagnated stands, such as shown in figure 6. These stands have been overdense for so long that they will never produce usable timber. However, the more important loss of productivity has occurred on many thousands of acres on which overcrowding has retarded but not stagnated the stands. Only 38 percent of the young timber on the North Slope qualifies as good growing stock (fig. 7). The main reason for the poor condition of the rest of the growing stock is excessive numbers of trees in stand after stand.

THE NORTH SLOPE FOREST IS IN A STATE OF RAPID ATTRITION

Were it not for the fact the North Slope timber is predominantly mature and overmature and that stand conditions have been aggravated by past cutting and fire protection practices, management decisions for the area could be deferred. Because more than half of the conifer timber is mature or overmature, the North Slope lodgepole pine has been under intermittent siege by mountain pine beetles for several decades. The most recent flareup began in the Hole-in-the-Rock area in 1956 and spread westward to the Blacks Fork River drainage. During this epidemic 165,000 acres were heavily attacked by beetles (fig. 8).

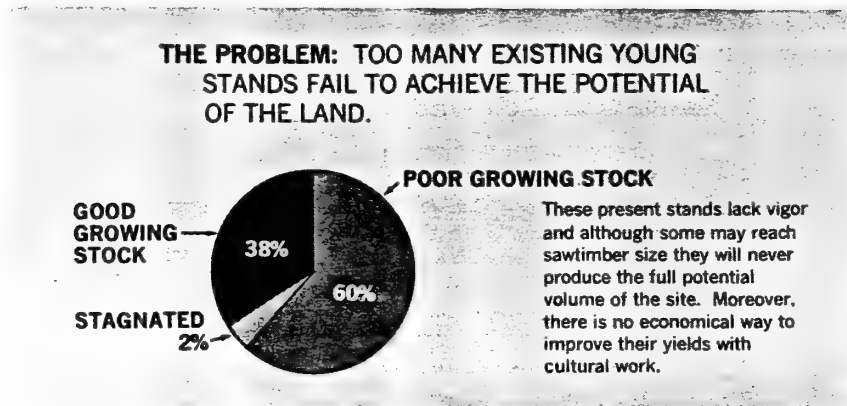


Figure 7

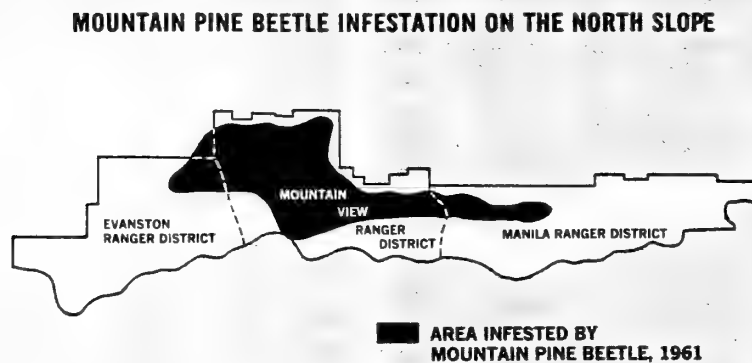


Figure 8

A large-scale program to contain the infestation was begun in 1958. Up through 1962, \$3.2 million was spent in this effort, which was successful to the extent that the beetle population has been held approximately at a normal endemic level since 1963 (figs. 9 and 10).

Whatever reduction in insect numbers has been caused by cyclic changes and control programs, the respite must be regarded as only temporary. Forty-four percent of the 201,000 acres of mature and overmature timber is classified as "high risk" (table 7). Until this timber is logged or killed, periodic flareups of the mountain pine beetle and other insects must be expected.

Figure 9. — Though the mountain pine beetle is being blamed for the loss of millions of board feet of sawtimber on the North Slope, these losses are only the dramatic finale to a long history of stand deterioration. The buildup of the insect attack in this stand and others started in overage timber long past its prime.



Figure 10. — The strategy of pine beetle control has been based on destroying infested trees by spraying or other means. The most dramatic and imaginative approach was "Operation Pushover." The trees on several thousand acres of badly infested timber were pushed over, piled, and burned. This operation not only killed the insects, it also destroyed the dwarfmistletoe and cleared the ground for disease-free new stands.

Table 7. — AREA OF MATURE AND OVERMATURE CONIFER
TIMBER BY FOREST TYPES AND RISK CLASS

Type	High risk	Low risk	Total
	----- Acres -----		
Subalpine fir	1,448	375	1,823
Douglas-fir	2,900	9,729	12,629
Lodgepole pine	75,511	57,059	132,570
Ponderosa pine	1,392	9,601	10,993
Spruce	7,530	35,076	42,606
Total	88,781	111,840	200,621

Table 8. — NUMBER OF LODGEPOLE PINE TREES
KILLED BY MOUNTAIN PINE BEETLES,
1956—1961

Year	Thousands
1956	100.0
1957	108.6
1958	192.0
1959	199.2
1960	304.6
1961	300.0
Total	1,204.4

Losses during this epidemic varied from stand to stand. However, the damage was most severe in older stands, particularly the ones heavily infected with dwarfmistletoe. Between 1956 and 1961 more than a million lodgepole pine trees were killed by pine beetles (table 8). Since these insects usually concentrate on the larger trees, the volume loss has been high. Data are not available to show the exact volume of the utilizable-size trees that have been killed; however, many sawtimber stands have been reduced to ghost forests of dead trees. A few timber inventory plots examined in 1962 had lost about 40 percent of their sawtimber volume in the preceding few years.

Dwarfmistletoe is putting the finishing touch on the deterioration of many North Slope forests. This plant parasite has constantly plagued the lodgepole pine on the North Slope. However, it has become an increasingly serious problem in the past century. There are several reasons for this. In the first place, dwarfmistletoe thrives best where stands are open. Logging for railroad ties was largely a selective process that opened up stands. The substantial losses in older stands due to insects and other agents have created more openings; thus, conditions have been ideal for spread and intensification of dwarfmistletoe infection. Effective fire control in the past half century has aggravated the problem because fires had periodically destroyed the timber on infected areas and thus cleared the way for dwarfmistletoe-free young stands.

Almost 157,000 acres of lodgepole pine in the North Slope have 10 percent or more of their stems infected by dwarfmistletoe (table 9). The principal damage from this pest is reduction in tree vigor and growth. Analysis of 346 lodgepole pine trees in undisturbed stands on the North Slope indicated that trees with infection in all four quadrants of the crown are currently growing 80 percent as rapidly as uninfected trees. These data probably understate the problem because the uninfected trees used as a basis of comparison have subnormal vigor because of old age and past overcrowding. Studies elsewhere indicate that heavy infection reduces cubic-foot growth of the individual tree by half or more, and that a light infection reduces it more than one-third.² Figure 11 shows dwarfmistletoe destruction in the North Slope at its worst.

Table 9. — AREA OF LODGEPOLE PINE TYPE
BY DEGREE OF DWARFMISTLETOE INFECTION

Percent of trees infected	Acres
0 - 9	126,590
10 - 29	65,748
30 - 54	38,711
55 - 79	22,495
79 - 100	29,752
Total	283,296

PRODUCTIVITY OF THE NORTH SLOPE FOREST CAN BE GREATLY INCREASED

The deteriorated condition of the North Slope forest and the difficult problems that face the land manager tend to obscure the fact that this area could produce a substantial output of timber. The average volume of future stands could be more than twice that of present stands with appropriate management. Table 10 compares the volume per acre in sawtimber trees in present mature stands of each type with what appears to be a reasonable estimate of potential yield for these areas.

Table 10. — PRESENT AND POTENTIAL VOLUMES PER ACRE
IN MATURE STANDS ON THE NORTH SLOPE

Forest type	Present	Potential ¹
	— — — Board feet — — —	
Lodgepole pine	4,200	13,000
Spruce	9,900	21,500
Ponderosa pine	5,000	13,500
Douglas-fir	5,200	11,500
Subalpine fir	8,100	12,500

¹Weighted average for all site classes.

²Kimmey, James W. Dwarfmistletoes of California and their control. U. S. Forest Serv., California Forest & Range Exp. Sta. Tech. Paper 19, 12 pp., illus. 1957.



Figure 11. — Dwarfmistletoe probably has been present in the timber of the North Slope for centuries. However, partially cutting the lodgepole pine stands lets more light into the stand canopy and encourages the parasite to spread. Young trees established under infected old trees, as shown here, are generally loaded with dwarfmistletoe.

Undoubtedly, the greatest single requirement for growing these potential volumes is to control stocking, especially in lodgepole pine stands. Loss of growth caused by overcrowding is virtually certain in lodgepole pine stands unless they are thinned at the proper time. Another important requirement, of course, is to prevent mistletoe from infecting future stands (fig. 12).



Figure 12. — This lodgepole pine stand shows that the North Slope can produce good timber. Sawtimber trees in this stand range up to 18 inches in diameter and average about 80 feet in height.

A LARGE EXPENDITURE WILL BE REQUIRED TO RESTORE THE NORTH SLOPE FOREST TO PRODUCTIVE CONDITION

The commercial forest of the North Slope includes thousands of acres that produce so little timber that they are not likely to be considered economically operable in the future even though publicly owned. How large that area is depends upon operating costs that can be estimated with some realism, future values that can only be guessed, and the acceptable relationship between the two. In this study, economically operable areas were assumed to be those in which stumpage values in the next rotation would exceed costs for development and rehabilitation. Seventy-five of the 94 compartments are operable on this basis. These 75 compartments include 252,000 acres of the 404,000 acres of commercial forest in the North Slope.

The cost of restoring these 252,000 acres to a productive condition will probably run higher than \$80 an acre, exclusive of future insect control costs.

Since the North Slope is still relatively undeveloped, the additional road system required to utilize and manage the operable timber will cost about \$7 million. However, a 600- to 900-mile road network, costing about \$5 million, has tentatively been planned for the area, and nearly all of this system is primarily for recreation and other purposes not related to timber management. This can now be regarded only as a rough estimate of road needs for multiple use management and the specific portions chargeable to various functions are partly a matter of arbitrary judgment. Yet, it is important that uses not related to timber management will undoubtedly bear much of the development cost. If construction of these roads is charged to other uses, there still would remain \$2 million of additional road construction required to utilize the timber.

If the operable timber area on the North Slope is to be devoted to timber growing, the big cost during the first rotation will be for land management measures required to convert the presently decadent timber into a vigorous young forest. More than \$7 million will be required to clean up dead and unutilizable timber and logging debris. Another \$9 million will be needed for subsequent site preparation and stand regeneration. Thinning to prevent overstocking in the new timber crop will add another \$2.6 million of costs.

These road development and management costs add up to \$21.1 million (table 11). Basic costs of land administration are not included as they will continue whether or not this area is devoted to timber growing.

Table 11. — COST OF DEVELOPING THE TIMBER RESOURCE
AND RESTORING THE LAND TO PRODUCTION

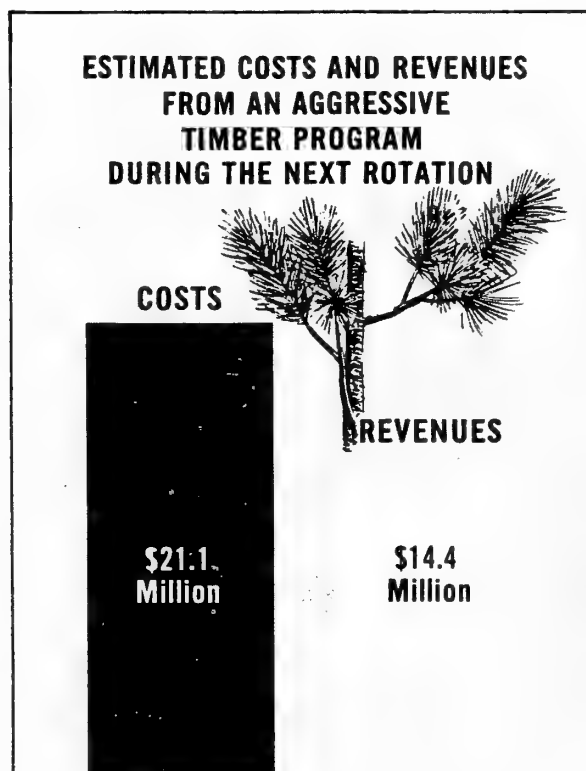
	Million dollars
Additional roads chargeable to timber	2.0
Slash disposal	7.2
Site preparation and stand regeneration	8.8
Thinning	2.6
Erosion control	.5
Total	21.1

PRINCIPAL ISSUES THE LAND MANAGER MUST CONSIDER

After the public land manager has systematically excluded those areas that he believes will not be operable under any circumstances, he continues to face the issue of economic feasibility. In the North Slope the central issue is simple. Are the benefits to be realized from an intensive timber growing effort on 252,000 acres great enough to justify spending \$21.1 million?

In this case there can be no refuge in the financial calculations. There are about 2 billion board feet of sawtimber on the North Slope today. Assuming that this volume could be logged from present stands during the first rotation (a generous assumption in view of recent losses) and assuming the average value of this stumpage would be \$7 per thousand board feet (the average sale price in 1963 was \$3.04 in the Intermountain Region), these timber yields are worth about \$14.4 million (fig. 13). In other words, from a strictly financial point of view, the venture has all the earmarks of a losing proposition. Thus, the desirability of timber growing on the North Slope must be determined by weighing the excess of costs over stumpage values against other considerations, which can be grouped under four headings:

1. Future national need for wood
2. Local need for income
3. Relation of timber growing to the total land management operation
4. Relation to national development



Future national need for wood

This subject has aroused and will continue to provoke considerable argument because future needs for wood cannot be measured. Estimates of long-range national demands for timber have been made periodically during the past several decades. All indicate a rising demand for wood. However, no estimates have been projected beyond the year 2000, and it is anyone's guess how great the need for timber products will be 100 years and more hence.

Since facts about this distant future are obviously not obtainable, present public policy cannot be based on *what will happen*, but must instead be related to the possibility of need. Policy decisions related to such long-range planning become more realistic if they are viewed as steps in meeting uncertainties.

In developing public timber policy the following line of reasoning seems realistic insofar as future national demands for wood are concerned: The population of the United States is definitely headed upward, and nothing short of catastrophe will change that. A median estimate of the Nation's population in the year 2000 is 325 million people. There is no present indication that the number of people in the United States will not rise above that level in later years.

Although a progressively higher proportion of the total national effort will go into services, the need for raw materials will undoubtedly continue to mount along with population, if living standards are to be maintained and improved. Timber needs in the United States to the year 2000 are discussed in a recent report.³ Wood is only one essential raw material, and the future demand for wood therefore will depend partly on the availability of the other materials.

Availability itself is a complex consideration dependent upon physical supply, technological progress, and restrictions imposed by national boundaries. No long-range analysis has yet pieced together a reliable picture of total resource availability a century hence and the resultant likely need for wood. However, there is a possibility that other raw materials may become economically less available in the next century, a factor that might substantially increase needs for wood above the level that can now be anticipated. Much of the case for timber growing on the North Slope and areas like it rests on this possibility.

There is the further problem of priorities between regions and areas. This may not be a one-sided matter. Two main liabilities of this region are a large area of low site land and long distance to principal markets. These liabilities may be more than offset by an important advantage—a high proportion of public ownership. To increase the quality and quantity of timber yields substantially in any region will require considerable acceleration of forestry. Whether it is possible to achieve and maintain a high level of forestry on millions of small private holdings which predominate in the East remains to be seen. This is feasible on public lands.

Local need for income

A perennial issue in parts of the Mountain States is the problem of providing economic opportunity. As in other parts of the Nation, economic growth has been more rapid in metropolitan areas than in rural areas and in small communities where the economy

³U. S. Forest Service. Timber trends in the United States. U. S. Dep. Agr. Forest Resource Rep. 17, 235 pp., illus. 1965.

is often closely tied to the harvest or primary use and processing of such natural resources as crops, minerals, and timber.

For example, between 1950 and 1960 the population of the Salt Lake City metropolitan area increased nearly 40 percent compared with only a 22-percent increase in the three counties adjacent to the North Slope (Sweetwater and Uinta Counties, Wyoming, and Daggett County, Utah). During this same period, median income in this three-county area rose only two-thirds as much as in nearby Salt Lake City.

In some areas where economic growth is slow the resource base is already being utilized as fully as present technology permits. The opportunity to expand economic growth in these areas rests largely on new technology that will expand the resource bases or upon developing economic activities that do not depend on primary use of resources.

In other areas, however, some of the existing resources are not being fully utilized and may provide an opportunity for expanding economic growth and preventing the development of depressed communities. The forest resource of the North Slope is an example.

The timber in this locality could contribute significantly to the local economy. Only a few small sawmills are now cutting North Slope timber. The saw logs and poles cut by these mills amount to about one-fourth of the annual cut that the present stands could support (fig. 14). There is enough wood in trees 5 inches d.b.h. and larger of the North Slope to support a 200-ton sulphate pulpmill for 65 years.⁴

Relation of timber growing to the total land management operation

However much it may be desirable to discount timber values as such in the North Slope—water, recreation, and wildlife values on this area are extremely important.

The North Slope is one of the more productive watersheds in the State of Utah, which in the main is a moisture-deficient area (fig. 15).

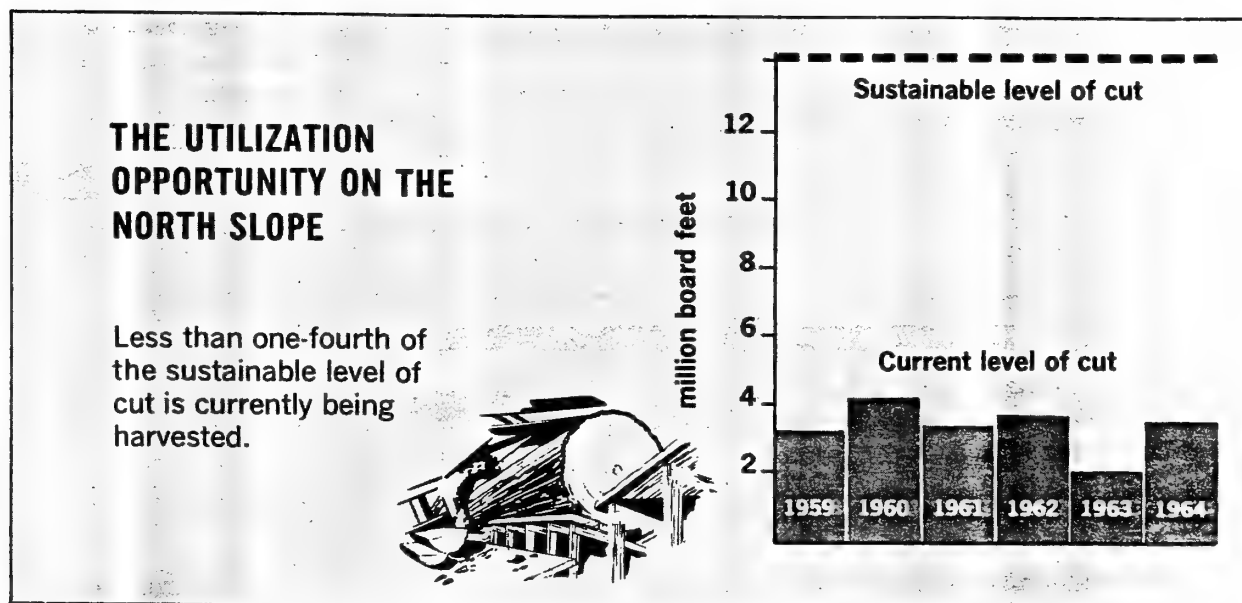


Figure 14

⁴Hutchison, S. Blair, and John H. Wikstrom. Industrial opportunities in the headwaters timber development unit. U.S. Forest Serv., Intermountain Forest & Range Exp. Sta. Res. Paper 45, 70 pp., illus. 1957.

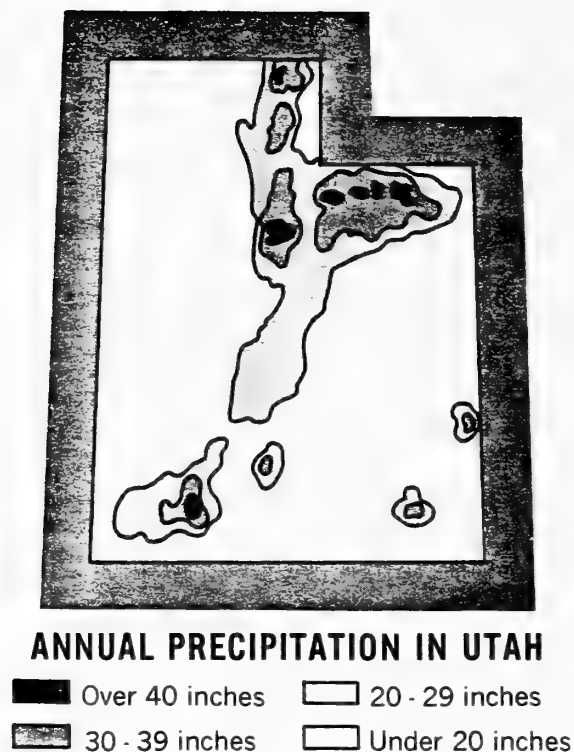


Figure 15. — Annual precipitation on the North Slope ranges from less than 12 inches to more than 40 inches.

Lakes and streams are also an important recreational asset. About 400 lakes in the North Slope are larger than 1 acre and there are about 600 miles of streams. The area is close to the population centers of Utah, a short side trip off one of the main east-west highways across the United States, and adjacent to the Flaming Gorge dam and reservoir. This combination of factors promises to make it a heavily used area for outdoor recreation (fig. 16). A preview of what may happen is provided by the Flaming Gorge reservoir itself. Although recreation facilities on this 91-mile-long reservoir on the Green River were only partly developed in 1964, at least 300,000 visits were made to the campgrounds, boat ramps, and other facilities adjacent to this manmade lake in that year. Recreation opportunities are enhanced by the wildlife population. Like many other parts of Utah, this is an excellent hunting ground for deer.

Decisions on managing North Slope timber must take account of these other values and the total land management operation. At present the land manager has only some broad principles to guide him. Research has shown that the timing, quality, and quantity of water flows can be influenced by the manner of timber management.⁵ Nobody is in a position to say precisely what this means in the way of the specifics of cutting and handling the timber in the North Slope. More study will be needed to answer this question. However, there is every reason to believe that some sort of positive timber management will be necessary as part of water management on the North Slope.

⁵Annual report, U. S. Forest Serv., Rocky Mountain Forest and Range Exp. Sta., 1961.



Figure 16. — On peak days more than 200 campers and fishermen ring this 50-acre lake which, like several other heavily used recreation lakes on the North Slope, is also a reservoir that is drained down during the summer.

The issue with regard to game management is perhaps a bit more clear-cut. Some portions of the North Slope are not now satisfactory for recreational use or wildlife habitat because of the condition of the timber. In some localities the timber growth is so dense the area has become poor habitat for big game and upland game birds. Lack of access and dense timber, moreover, make orderly game harvest very difficult. Likewise, recreationists other than hunters find it difficult to use some of the area because the stands are so dense or because the down timber has become a jungle. Thus, any timber-growing program could improve recreation and wildlife management outside the Uinta Primitive Area.

Not the least of the considerations is the opportunity to make the North Slope financially self-sufficient in the more distant future. Although the values involved are presumed to justify the costs of administering the National Forest lands on the North Slope, the cost has always exceeded the direct financial return to the Federal treasury. Timber management offers a means for making the North Slope financially self-sufficient one rotation hence when the initial task of rehabilitation has been completed.

This is illustrated by the following tables and charts that present the hypothetical situations with and without timber management. These must be regarded as hypothetical primarily because of present uncertainty as to what timber will be worth 100 years and more in the future.

Under the assumptions that have been made, if the North Slope forest is rehabilitated the gross value of the timber harvested annually during the second rotation would be about \$266,000. This would more than cover the annual timber growing expenditures on the North Slope for stand reestablishment, stocking control, and related costs. In addition, these annual timber revenues should cover all the basic costs of administration, fire protection, and maintenance, and about \$32,000 would be left over for roadbuilding and other improvements (fig. 17). The assumptions of cost and value behind these calculations are shown in tables 12 and 13.

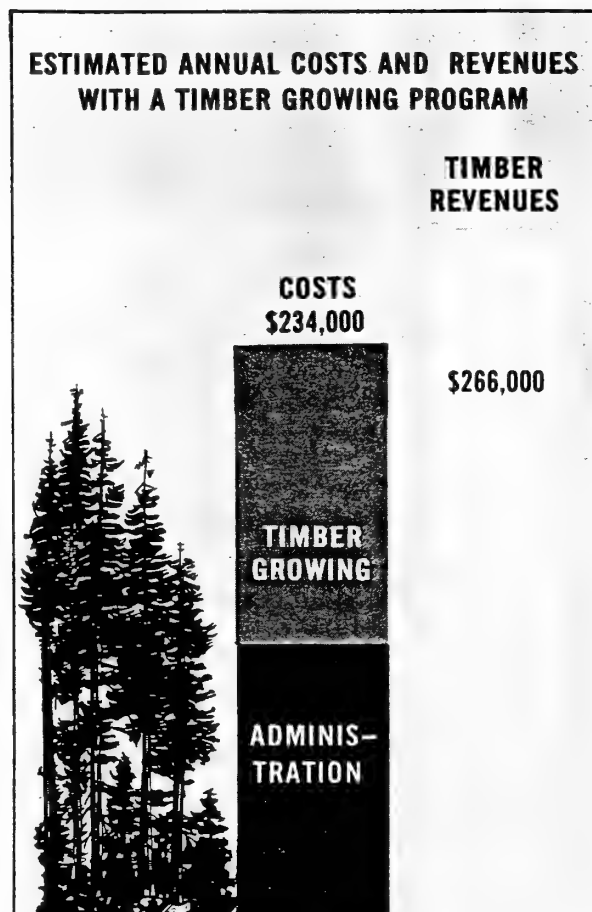


Figure 17

Table 12. — PROBABLE COSTS OF TIMBER GROWING BY
FOREST TYPE¹

Type	Slash disposal	Site preparation and planting	Stocking control	Erosion control	Total
— — — — — Dollars per acre — — — — —					
Ponderosa pine	25.00	45.00	5.00	1.50	76.50
Subalpine fir and spruce	35.00	60.00	5.00	1.50	101.50
Douglas-fir	25.00	45.00	5.00	1.50	76.50
Lodgepole pine	17.00	26.50	15.00	1.50	60.00

¹Source: Adapted from U. S. Forest Service, Regions 1 and 4 records.

Table 13. — PROBABLE VALUE OF HARVEST YIELDS FROM
MANAGED STANDS BY FOREST TYPE AND SITE CLASS

Type	Medium site	Low site	Very low site
— — — — — Dollars per acre — — — — —			
Ponderosa pine	515	196	30
Spruce	517	164	68
Douglas-fir	310	71	39
Lodgepole pine	227	79	25
Subalpine fir	184	72	32

If, on the other hand, the North Slope forest is not rehabilitated during the coming years, the long-run outlook will presumably be quite different. Total annual costs, after the first rotation, will be lower if no efforts are made to manage the timber. However, the timber revenues produced by an unmanaged forest will not begin to cover even the basic administration costs (fig. 18).

Other uses, particularly recreation, are beginning to produce revenue. These uses could greatly change the financial situation on the North Slope. Nevertheless, if the forest is managed for its timber, revenues from that timber would go far toward paying for the administration of this area.

Relation to national development

The wedding of the computer with increasingly sophisticated production machinery has been increasing man-hour productivity at the rate of 30 percent per decade. This mounting productivity has become a menace as well as a boon because undirected it can solidify and already has to a degree solidified the depressed segments of our society by increasing unemployment. Public programs to aid depressed people and depressed areas, and programs to beautify cities, rehabilitate slums, and remove billboards from highway rights-of-

way are manifestations of both the national capability to do more in the neglected public sectors of our economy and of the need to provide additional productive employment.

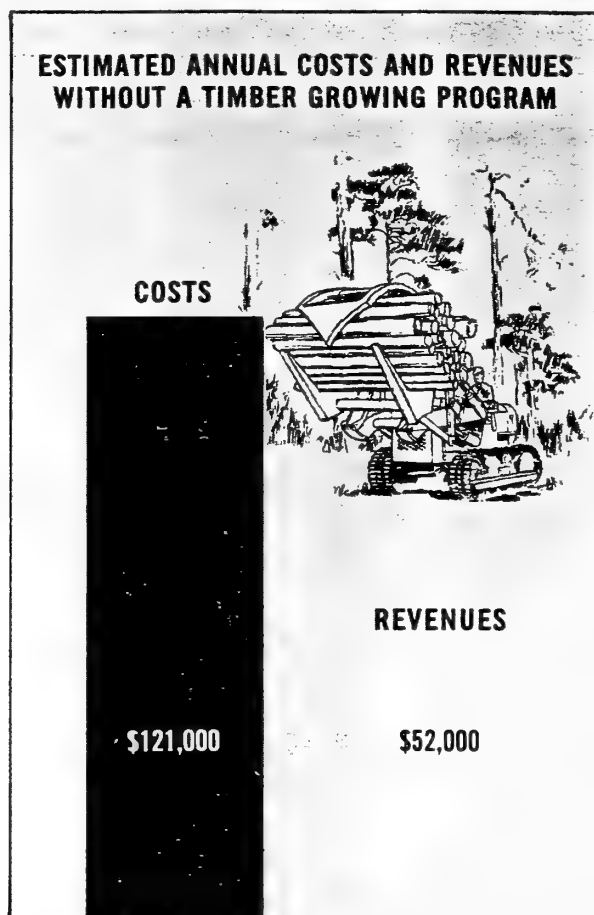


Figure 18

How surplus human energy will be utilized in creation of a better society and stronger nation remains to be seen. However, the "North Slopes" of the West have a readily identifiable employment opportunity. Surplus labor can be utilized not only to enhance current resource values, but to build up and stockpile productivity for the indeterminate needs of the future.

SUMMARY

The North Slope is typical of many public forest areas in the West. Its timber productivity is low but could, with special effort, be increased. The public is in no position to walk away from this activity if for no other reason, because water, recreation, and other values require some timber management. How much and what kind of timber management these values require is not yet fully understood. How far forestry effort should be carried beyond the minimum level necessary to meet current demands for water, recreation, etc., depends on several considerations. One is much longer range evaluations than are now available of future requirements for wood, water, and other values. Another is the extent to which it is feasible to maintain a viable local economy.

Mushrooming capabilities for industrial production free the human energies required to greatly accelerate conservation effort should this loom high enough in national priorities.

Hutchison, S. Blair, John H. Wikstrom, Roscoe Burwell Herrington, and Robert E. Benson.

1965. Timber management issues on Utah's North Slope. U. S. Dep. Agr., Forest Serv., Intermountain Forest and Range Exp. Sta., Ogden, Utah. 23 pp., illus. (U. S. Forest Serv. Res. Paper INT-23)

This paper describes salient problems in management of timberlands on the North Slope of the Uinta Mountains and discusses broad issues inherent in management of "low site" areas.

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Headquarters for the Intermountain Forest and Range Experiment Station are in Ogden, Utah. Project headquarters are also at:

Boise, Idaho

Bozeman, Montana (in cooperation with Montana State University)

Logan, Utah (in cooperation with Utah State University)

Missoula, Montana (in cooperation with University of Montana)

Moscow, Idaho (in cooperation with the University of Idaho)

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FOREST SERVICE CREED

The Forest Service of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's Forest Resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

